

**REMARKS**

The applicants have carefully considered the official action dated June 28, 2006, and the references it cites. In the official action, the abstract was objected to for allegedly using legal words, the title was objected to as non-descriptive, claims 1-25 were rejected under 35 U.S.C. 101 as allegedly directed to non-statutory subject matter, and claims 1-25 were rejected under 35 U.S.C. 103(a) as unpatentable over “Compositional Pointer and Escape Analysis for Java Programs” by John Whaley and Martin Rinard (“Whaley”), in view of “Effective Synchronization Removal for Java” by Erik Ruf (“Ruf”).

By way of this response, claims 20 and 25 have been amended leaving claims 1-25 pending in this application, of which claims 1, 7, 14, and 20 are independent. In view of the foregoing amendments and the following remarks, the applicants respectfully traverse the outstanding rejections and respectfully submit that all pending claims are in condition for allowance. Favorable reconsideration is respectfully requested.

Turning to the objection to the abstract, the examiner directs the applicants to MPEP §608.01(b) for further clarification of proper abstract practice. In particular, MPEP §608.01(b)(C) instructs applicants to avoid legal phraseology and recites the terms “means” and “said” as such exemplary phraseology. Moreover, MPEP §608.01(b)(E) provides applicants with sample abstracts, which explicitly employ the term “method.” Accordingly, the applicants respectfully submit that the term “method” is not legal phraseology intended to be avoided by MPEP §608.01(b)(C). The applicants also respectfully submit that the terms “apparatus” and “method” are complimentary terms appropriately used to enable the reader to quickly determine the nature and gist of the disclosure, as envisioned by MPEP §608.01(b)(A).

Turning to the objection to the title, applicants have amended the title as “Escape Analysis of an Application Using Escape Indicators.”

**I. The Rejections Under 35 U.S.C. § 101**

Turning to the rejection under 35 U.S.C. § 101, the applicants respectfully maintain that rejected claims 1-25 are directed to statutory subject matter. As a preliminary matter, the applicants wish to thank examiner Ingberg for the United States Patent and Trademark Office (USPTO) guidelines regarding 35 U.S.C. § 101 by providing the link to “Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility,” found on the World Wide Web at

[www.uspto.gov/web/offices/pac/dapp/opla/preognotice/guidelines101\\_20051026.pdf](http://www.uspto.gov/web/offices/pac/dapp/opla/preognotice/guidelines101_20051026.pdf)

(“Guidelines”).

**A. Claims 1-25 Are Directed To Subject Matter That Involves a Physical Transformation**

The applicants maintain that a claim directed to a practical application constitutes statutory subject matter if it involves a physical transformation or if it produces a useful, tangible, and concrete result, but in neither case preempts an abstract idea, a law of nature, or a natural phenomenon. *Diamond v. Diehr*, 450 U.S. 175, 183-184, 187, and 192 (U.S. 1981); *State St. Bank & Trust Co. v. Signature Fin. Group*, 149 F.3d 1368, 1373 (Fed. Cir. 1998). In particular, claims 1-25 are directed to subject matter that involves a physical transformation. The use of mathematical calculations to derive a value having a non-abstract and “specific meaning” constitutes a physical transformation. *Arrhythmia Research Technology, Inc. v. Corazonix Corp.*, 958 F.2d 1053, 1060 (Fed. Cir. 1992); *State St. Bank & Trust Co.*, 149 F.3d at 1373.

In *Arrhythmia Research Technology, Inc.*, a process claim recited, *inter alia*, converting signals to digital values, applying the digital values to a particular operation, determining an arithmetic value of the amplitude of an output, and comparing the arithmetic value to another value. 958 F.2d at 1055. Transforming electrical signals to a non-abstract, arithmetic value having a particular meaning indicative of a person's heart activity constituted a physical transformation. *Id.* The Federal Circuit has also held that using a mathematical process to derive a final share price from data representing dollar amounts constitutes a physical transformation. *State St. Bank & Trust Co.*, 149 F.3d at 1373.

Claims 1-25 are directed to, *inter alia*, a method to analyze escape analysis of an application comprising identifying a first escape indicator and a second escape indicator associated with each of the at least one equivalence class. The resulting analysis of the escape analysis, itself, constitutes more than a mere abstract value. Generally speaking, identifying a first escape indicator and a second escape indicator associated with each of the at least one equivalence class allows for the determination of reference variables with lesser concern that an escape status of a caller method influences other caller methods. Moreover, claims 1-25 also recite, *inter alia*, propagating the one or more methods based on the first and second escape indicators. As such, the aforementioned method to analyze escape analysis of an application is not an abstract result because it affects synchronization operations. *See AT&T Corp.*, 172 F.3d at 1358 (holding that a value indicative of a call recipient's primary interexchange carrier ("PIC") was not abstract because it facilitated implementing a subscriber billing process).

**B. Claims 1-25 Produce a Useful, Concrete, and Tangible Result**

However, even if claims 1-25 did not involve a physical transformation, those claims would not necessarily constitute non-statutory subject matter. *AT&T Corp. v. Excel Communs., Inc.*, 172 F.3d 1352, 1358-1359 (Fed. Cir. 1999). In *AT&T Corp.*, the Federal Circuit clarified that a physical transformation is merely an example indicative of statutory subject matter. *Id.* at 1359. Accordingly, even if claims 1-25 do not include a physical transformation, the claims constitute statutory subject matter because they produce a useful, concrete, and tangible result and they do not preempt an abstract idea, a law of nature, or a natural phenomenon. In particular, a claimed invention that produces a number shall not necessarily be deemed as not producing a useful, concrete, and tangible result. *State St. Bank & Trust Co.*, 149 F.3d at 1373. On the contrary, a mathematical algorithm reduced to a practical application constitutes a useful, concrete, and tangible result. *Id.*; see also *AT&T Corp.*, 172 F.3d at 1356 (“the judicially-defined proscription against patenting of a ‘mathematical algorithm,’ to the extent such a proscription still exists, is narrowly limited to mathematical algorithms in the abstract.”).

In *State St. Bank & Trust Co.*, the claimed invention recited a mathematical algorithm used to transform data corresponding to dollar amounts to a final share price. *Id.* at 1373. The final share price was a useful, concrete, and tangible result because it was generated for subsequent use and was relied upon for further processes. *Id.* (explaining that “the final share price [was] momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades”).

Independent claims 1, 7, 14, and 20 of the subject application involve, *inter alia*, identifying a first escape indicator and a second escape indicator associated with each of the

at least one equivalence class, and propagating the one or more methods based on the first and second escape indicators. The resulting analysis improves the technique to eliminate unnecessary synchronization operations. Thus, the claimed subject matter is not an abstract idea but, instead, constitutes a useful, concrete, and tangible result having a practical application.

Additionally, the official action appears to suggest that a tangible result would be evident if the claim were embodied in a computer readable medium. [See official action, pages 2 and 3]. However, if determining statutory subject matter is merely based on whether the claim recites a method or a machine readable medium, then claims 7-13 would certainly qualify as statutory subject matter (i.e., claims 7-13 are directed to a machine readable medium storing instructions).

While the applicants employ substantive case law to determine and argue that claims 1-25 recite statutory subject matter, the applicants respectfully request further clarification of applicable persuasive case law, if any, that may further explain how a claim is deemed to illustrate a tangible result merely by virtue of its embodiment on a computer readable medium, as suggested in the official action on pages 2 and 3. As identified by the Guidelines provided by the examiner, the USPTO has a burden to set forth a *prima facie* case of unpatentability and provide an explanation why the subject matter falls outside all the statutory categories. However, the applicant cannot reasonably respond to the official action in view of alleged reasons of non-statutory subject matter that appear to directly conflict with both Federal Circuit case law and the Guidelines.

In view of the foregoing, the applicants respectfully submit that claims 1-25 constitute statutory subject matter under 35 U.S.C. § 101 and respectfully request withdrawal of the §101 rejection.

## **II. The Rejections Under 35 U.S.C. § 103(a)**

Turning to the art rejections, the applicants respectfully submit that independent claims 1, 7, 14, and 20 are allowable over Whaley, alone or in combination with Ruf. Independent claims 1, 7, 14, and 20 are directed to methods, apparatus, systems, and machine readable media storing instruction that, *inter alia*, identify a first escape indicator and a second escape indicator associated with each of the at least one equivalence class, and propagate the one or more methods based on the first and second escape indicators. None of the cited references teaches or suggests identifying a first escape indicator and a second escape indicator associated with each of the at least one equivalence class, and propagating the one or more methods based on the first and second escape indicators, as recited in claims 1, 7, 14, and 20.

Whaley teaches, *inter alia*, escape analysis generally and points-to escape graphs that characterize how local variables in objects refer to other objects. [Whaley, Abstract, §1 page 187, §1.1 page 187]. Whaley also teaches implementations to eliminate synchronization and, for the sake of efficiency, object allocation on a stack rather than a heap. [Whaley, Abstract, §1.1 page 187]. However, Whaley's system is designed to analyze each method independently of its callers and, when analysis is performed, with respect to arbitrary regions of programs. [Whaley, §1.2 page 188, §1.3 page 188]. Consequently, Whaley acknowledges that the analysis result becomes more precise as more of the invoked methods are analyzed, but fails to teach or suggest identifying a first escape indicator and a second escape indicator

associated with each of the at least one equivalence class, and propagating the one or more methods based on the first and second escape indicators, as recited in independent claims 1, 7, 14, and 20. [*Whaley*, §1.2 page 188].

The examiner acknowledges, on page 3 of the official action, that Whaley does not teach equivalence. Accordingly, Whaley does not, and cannot teach identifying a first escape indicator and a second escape indicator, much less those associated with each of the at least one equivalence class. Furthermore, absent a first and second escape indicator associated with each of the at least one equivalence class, Whaley cannot teach propagating the one or more methods based on the first and second escape indicators.

The official action appears to contend that Ruf overcomes the deficiencies of Whaley by teaching identifying a first escape indicator and a second escape indicator associated with each of the at least one equivalence class. On the contrary, Ruf teaches, *inter alia*, a technique for removing unnecessary synchronization operations from Java programs and employs equivalence based representations and “points-to” relationships for optimization in a flow-insensitive manner. [*Ruf*, Abstract, §1 page 209, §2.2 page 209]. In fact, unlike identifying a first escape indicator and a second escape indicator and propagating the one or more methods based on the first and second escape indicators, as recited in the independent claims, Ruf seeks convenience, efficiency, and minimized analysis time at the expense of precision. [*Ruf*, §1 and §2.2 page 209]. Rather than propagating the one or more methods based on the first and second escape indicators, Ruf describes the flow-insensitive manner of optimization and expounds upon representations constructed in a single pass and giving up flow directionality. [*Ruf*, §1 and §2.2 page 209].

As a result, because neither Whaley nor Ruf teach or suggest identifying a first escape indicator and a second escape indicator associated with each of the at least one equivalence class, and propagating the one or more methods based on the first and second escape indicators, neither Whaley nor Ruf, alone or in combination, render independent claims 1, 7, 14, and 20 obvious. Accordingly, the rejection of claims 1, 7, 14, and 20, and all claims dependent thereon, must be withdrawn for at least the foregoing reasons. /

**III. Conclusion**

In view of the foregoing, the applicants respectfully submit that this application is now in condition for allowance. If there are any remaining matters that the examiner would like to discuss, the examiner is invited to contact the undersigned representative at the telephone number set forth below.

Respectfully submitted,



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